

FISH STOCKING PROPOSAL

Region G

PROPOSAL: Stock lake trout at Eagle Lake at three-year intervals, beginning with 500 spring yearlings in 2015 and 800 spring yearlings thereafter.

After two public meetings held in April 2014, two lakes of the Fish River Chain - Eagle and St. Froid Lakes – proposals to manage for lake trout with stocking programs were vigorously supported. Originally, both lakes were proposed to be stocked in 2014, but the Eagle Lake program was delayed one year so that the degree of migration between the two lakes could be ascertained in the future; the lakes are connected by a 3.25 mile stretch of the Fish River (Nadeau Thoroughfare).

The objectives of this proposal are to:

- 1) Achieve a low, but catchable number of lake trout in the sport fishery;
- 2) Achieve fast growth soon after stocking;
- 3) Provide opportunity to catch lake trout >25 inches and approximately 5.5 pounds.

LOCATION: Northern Aroostook County in the Town of Eagle Lake. Eagle Lake is the third largest lake of the Fish River Chain and located furthest downstream before the Fish River joins the St. John River in Fort Kent.

CHARACTERISTICS: Surface area of 5,581 acres with a maximum depth of 136 feet and mean depth of 44 ft. Eagle Lake is a deep, oligotrophic lake with excellent water quality and abundant toge habitat (2,100 acres). Much of the shoreline to the north (outlet end) is heavily developed with year round homes; east of the Town of Eagle Lake is mostly undeveloped with intact shoreline, much of which is held by the State of Maine, Bureau of Public Lands.

NATURAL REPRODUCTION: There is abundant habitat for salmon and brook trout in two large thoroughfares entering the lake, one from each major arm of the Chain. The outlet also has excellent habitat for brook trout but salmon habitat here is particularly good. There are numerous brooks entering the lake that provide good trout habitat.

Successful lake trout reproduction has been rare since the initial survey in 1953 when no lake trout were sampled. There was successful spawning and recruitment in at least three years in the late 1990s, and combined with hatchery lake trout being stocked at the time, a large population resulted. This situation led to a smelt population crash, liberal regulations to reduce lake trout for many years, and poor salmon growth. There continues to be a small amount of lake trout reproduction. This proposed stocking is intended to supplement the current wild population.

EXISTING/HISTORICAL SPORT FISHERIES: The native sport fish at Eagle Lake are lake trout, brook trout, and whitefish. Few whitefish were caught during the 1953

survey, their numbers having been decimated by the introduction of salmon and smelt in the late 1800s. Salmon and smelt have replaced whitefish in the sport fishery today.

Eagle Lake supports fishing for smelt, salmon, and brook trout. Lake trout fishing has declined significantly since stocking ceased in 1999 and the wild population was reduced through liberal harvest regulations beginning in 2006. From 2010-2012, there was some excellent fishing for lake trout of large size and acceptable catch rates. The wild fish, however, are in such low numbers now that catches are very low. In the past several years anglers have approached the Department and have expressed interest in resuming management for lake trout.

COMPETITION FROM OTHER SPECIES: Eagle Lake is a large, oligotrophic lake and has a typical fish assemblage for northern Maine waters. In addition to the major sport fish, several minnow species are present as well as both sucker species, fallfish, and bullhead. Cusk also are present and are targeted by winter anglers. Yellow perch were introduced likely in the 1930s/1940s and have become very abundant in the past 10 years. The initial survey in 1953, which included six overnight gillnet sets, caught no yellow perch.

USE OF SPORT FISHERY: Winter use is currently increasing. The angler day estimate in 2013 was 2,780 compared to the 15 year average of 2,100. Summer use has not been measured since the mid-1990s when it averaged 4,660 anglers per season.

ACCESS: There is a large, modern public access launch and parking area situated in downtown Eagle Lake.

OTHER SPECIES PRESENT: BKF, BND, CCB, CMS, GLS, LCB, NSK, RWF, SCL, TSK,

BACKGROUND DATA: See attached slides from public meeting on April 8 2014.

We have attempted to model the future lake trout population using survival and mortality estimates from the literature and modified slightly based on observations during years of active lake trout stocking at Eagle and St. Froid Lakes. To do this, we first modeled historic stocking that would provide insight on a target population size or a threshold we would not want to exceed. We modeled the lake trout stocking from 1986-1999 to estimate catchable fish in those and subsequent years (slides 9-10). The 700+ catchable fish in the late 1990s-2001 is corroborated by angler catch rates and gillnet catch rates. This number of adult lake trout resulted in the wild fish surge observed in 2004-2007, which resulted in a smelt population crash, dissatisfaction in the sport fisheries, and prompted liberal harvest regulations on both lake trout and salmon.

There is a high desire to achieve a number of lake trout at Eagle Lake much lower than seen in the late 1990s and early 2000s. We chose a catchable number of approximately 325 fish as a target threshold that we wanted to remain well below (note this is the dark horizontal line in slides 10-12). We modeled several scenarios for hatchery-reared lake

trout and present two for comparison. A stocking scenario of 1000 SYs then 2000 SYs predicted too many fish at large, exceeding the 325 fish threshold in most years (Table 1; slide 11) even before the wild component is considered. In some years the number of catchable lake trout exceeded 500 fish, approaching the values seen in the late 1990s. The stocking plan of 500 then 800 SYs every third year resulted in a much more conservative outcome with the predicted number of fish usually far less than 325 (Table 2; slide 12). In most years the hatchery/wild fish should not exceed the target threshold. We do not expect a significant increase in wild recruitment from this level of stocking over the long-term.

STOCKING HISTORY: Landlocked salmon were stocked annually 1978-1996; lake trout were stocked 1986-1999. For more detail see slide 6.

REGULATIONS: B, S-2, S-3, S-16, S-24, S-26.

POSSIBLE EFFECTS: There are significant fisheries for brook trout, salmon, and smelt. There have been issues with declining smelt abundance during lake trout stocking in the past and salmon growth was negatively impacted as well. There is a strong desire to maintain a robust smelt population to support salmonid growth, but also for winter smelt angling (slides 3-4). A three-year rotation on stocking is deemed appropriate for managing smelt mortality, balancing predator-prey numbers, and adjusting stocking rates and regulations. There is a lower chance of stock-piling under a three-year rotation plan because there is ample opportunity for monitoring and management prior to stocking every third year when significant changes may be made in stocking and regulations.

EVALUATION: We have a large database of information from various sources from which we developed this stocking proposal and how results will be evaluated. Those data are summarized in the attached slides and consist of gillnetting, winter clerk surveys, and summer/winter voluntary surveys. This program will be evaluated mainly with future winter clerk survey data collected the season prior to stocking. Stocking adjustments, if needed, will be made just prior to stocking every third year. Harvest regulations will be adjusted as needed, especially in the event of high wild recruitment of lake trout as occurred in the recent past. Gillnetting data will also be used to monitor wild recruitment and age class abundance, growth and condition. Benchmarks have been set for the fishery (slide 13), which also include a catch rate objective for smelt in the winter hand-line fishery.

Table 1. Modeled lake trout population at Eagle Lake based on a three year stocking interval, 1000 spring yearlings initially then 2000 spring yearlings thereafter. Note below the total lake trout stocked for any 12 year period compared to the 14 year period, 1986-1999. The catchable fish predictions do not include the unknown wild component.

Stock 1000 then 2000 every 3 years

	# stocked	age	mortality	survival	2014 class	2017 class	2020 class	2023 class	total fish	catchable fish (age 3-7)
2014	1000	1	0.3	0.7	1000				1000	0
2015		2	0.35	0.65	700				700	0
2016		3	0.4	0.6	455				455	455
2017	2000	4	0.45	0.55	273	2000			2273	273
2018		5	0.5	0.5	150	1100			1250	150
2019		6	0.5	0.5	75	550			625	625
2020	2000	7	0.5	0.5	38	275	2000		2313	313
2021		8	0.5	0.5	19	138	1000		1157	138
2022		9	0.5	0.5	9	69	500		578	569
2023	2000	10	0.5	0.5	5	34	250	2000	2289	284
2024				0.5		17	125	1000	1142	125
2025				0.5		9	63	500	572	563
2026				0.5		4	19	250	273	269
2027				0.5			10	125	135	125
2028				0.5			5	63	68	
2029				0.5			2	31	33	

12 yr period = 7,000

14 yr period, 1986-1999 = 10,750

Table 2. Modeled lake trout population at Eagle Lake based on a three year stocking interval, 500 spring yearlings initially then 800 spring yearlings thereafter. Note below the total lake trout stocked for any 12 year period compared to the 14 year period, 1986-1999. The catchable fish predictions do not include the unknown wild component.

Stock 500 then 800 lake trout every three years

	# stocked	age	mortality	survival	2014 class	2017 class	2020 class	2023 class	total fish	catchable fish (age 3-7)
2014	500	1	0.3	0.7	500				500	0
2015		2	0.35	0.65	350				350	0
2016		3	0.4	0.6	228				228	228
2017	800	4	0.45	0.55	137	800			937	137
2018		5	0.5	0.5	75	440			515	75
2019		6	0.5	0.5	38	220			258	258
2020	800	7	0.5	0.5	19	110	800		929	129
2021		8	0.5	0.5	9	55	400		464	55
2022		9	0.5	0.5	5	28	200		233	228
2023	800	10	0.5	0.5	2	14	100	800	916	114
2024				0.5		7	50	400	457	50
2025				0.5		3	25	200	228	225
2026				0.5		2	19	100	121	119
2027				0.5			10	50	60	50
2028				0.5			5	25	30	
2029				0.5			2	13	15	

12 yr period =

2,900

14 yr period, 1986-1999 =

10,750

Eagle Lake Fisheries Management

Public Meeting at Eagle Lake
April 2014



SLIDE 1

Fishing Pressure Across the Chain

Winter 2013 Pressure - FR Chain		
Long		6,620
Cross		800
Square		900
Eagle		2,780
St. Froid		1,240
Portage		560
Carr P		160

**Eagle Lake
15yr avg:
2,100**

**26% of use is
smelt-only**

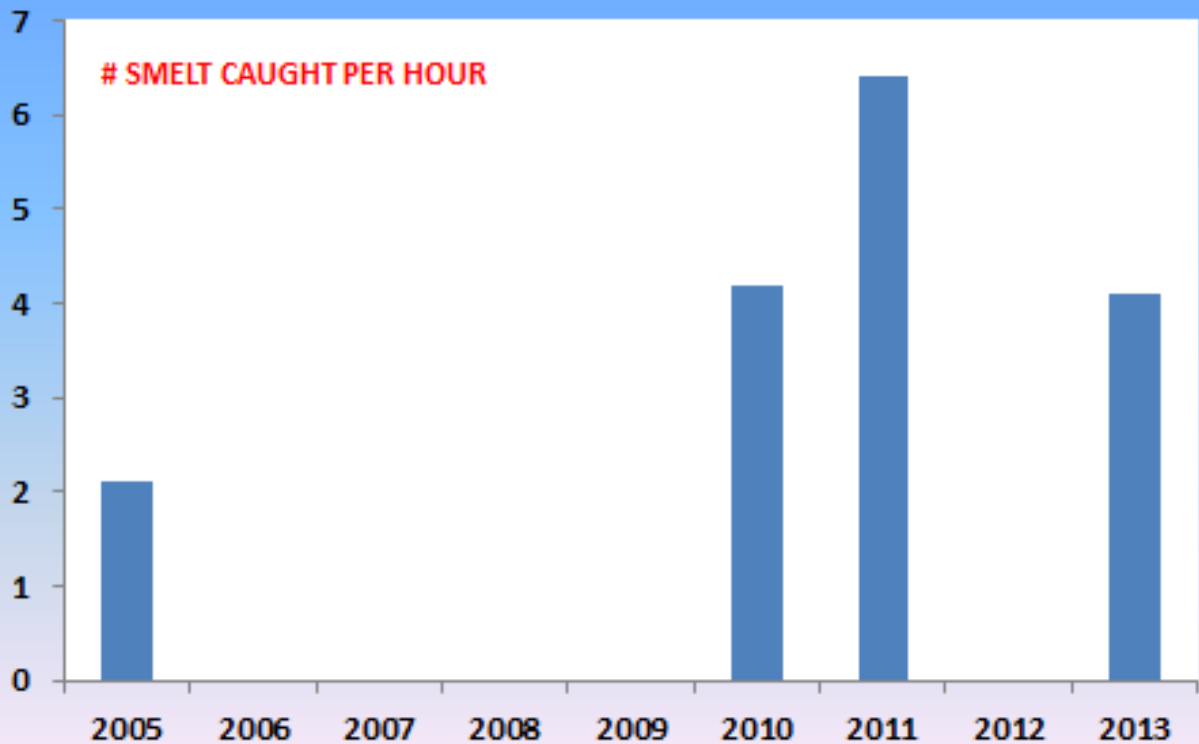
Hook & Line Smelting Culture

720 angler days in 2013 = 26% of total use...significant fishery!



SLIDE 3

SMELT CATCH RATES, CLERK SURVEY, WINTER



SLIDE 4

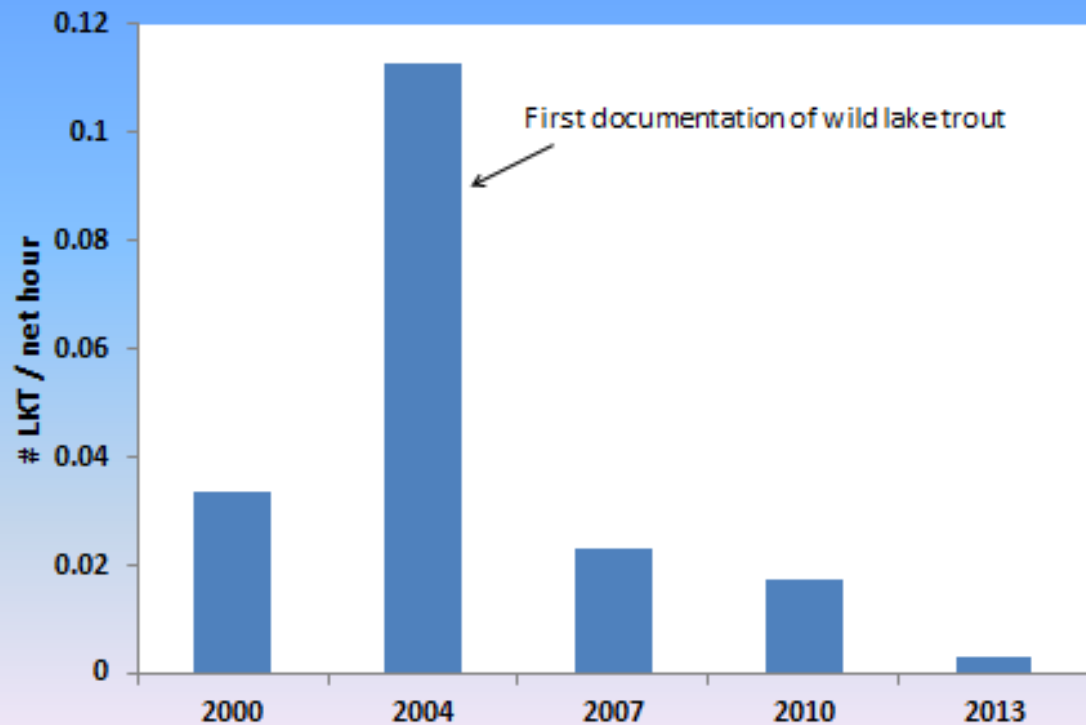
NOTES:

Smelt catch rates indicate a recovery in smelt numbers since stocking/regulation changes were made.

Spawning runs that can be observed have been strong; Gilmore Brook supporting a run for first time in 33 years in 2011.

Suspect that most spawning occurs in Nadeau and Michaud Thorofares.

Eagle Lake Togue Gill Netting CPUE



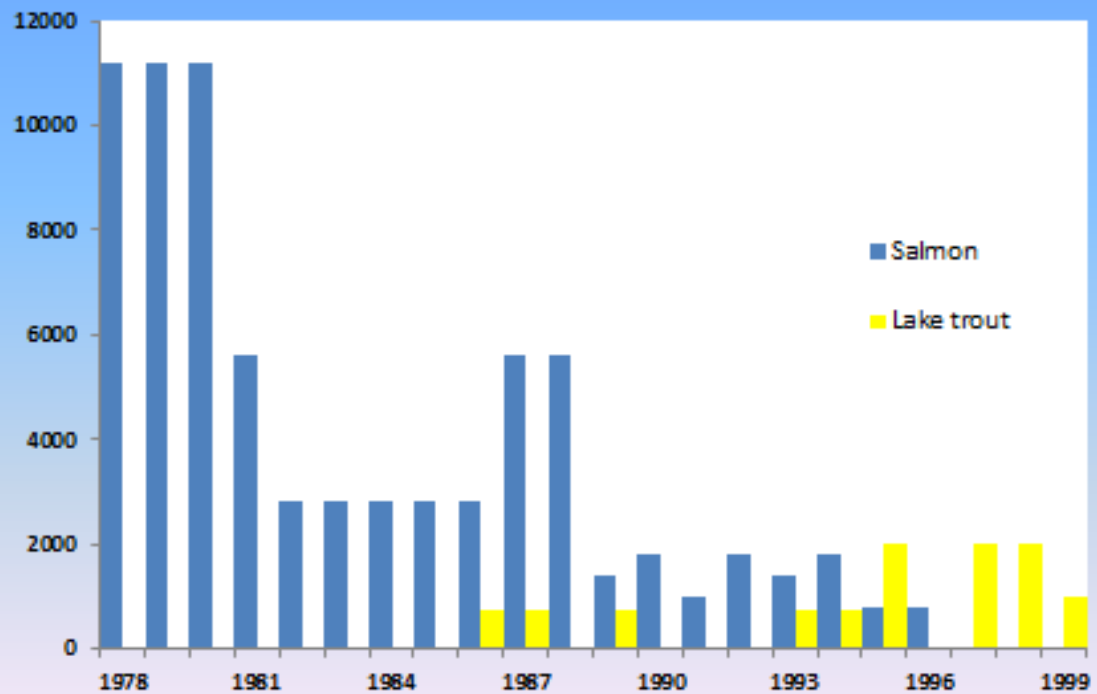
SLIDE 5

Lake trout numbers are decreasing since stocking ceased in 1999

Liberal harvest regulations implemented in 2006 were successful in reducing wild lake trout population so that smelt and salmon growth could recover

The most recent sample indicates wild lake trout are almost non-existent in the lake

EAGLE LAKE STOCKING, 1978 - CURRENT

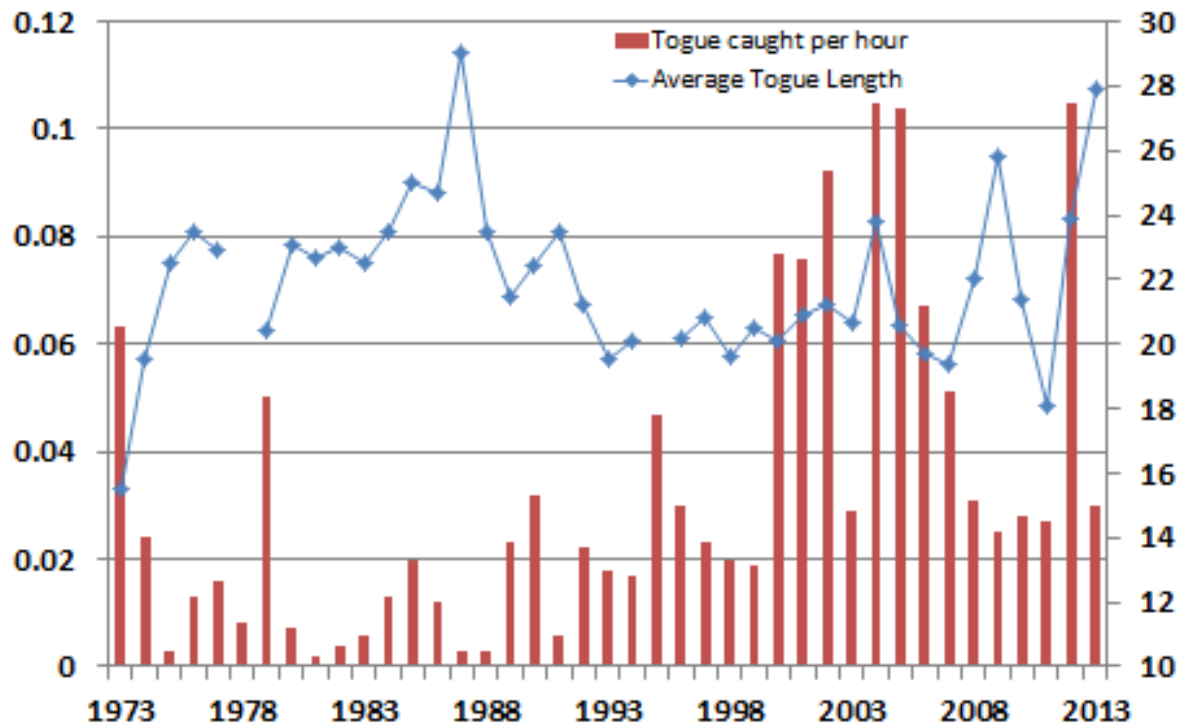


SLIDE 6

No stocking since 1999

Togue Size vs Catch Rate, 1973-2013

Voluntary Data



SLIDE 7

Early lake trout fishery was supported by drop-downs from St. Froid Lake

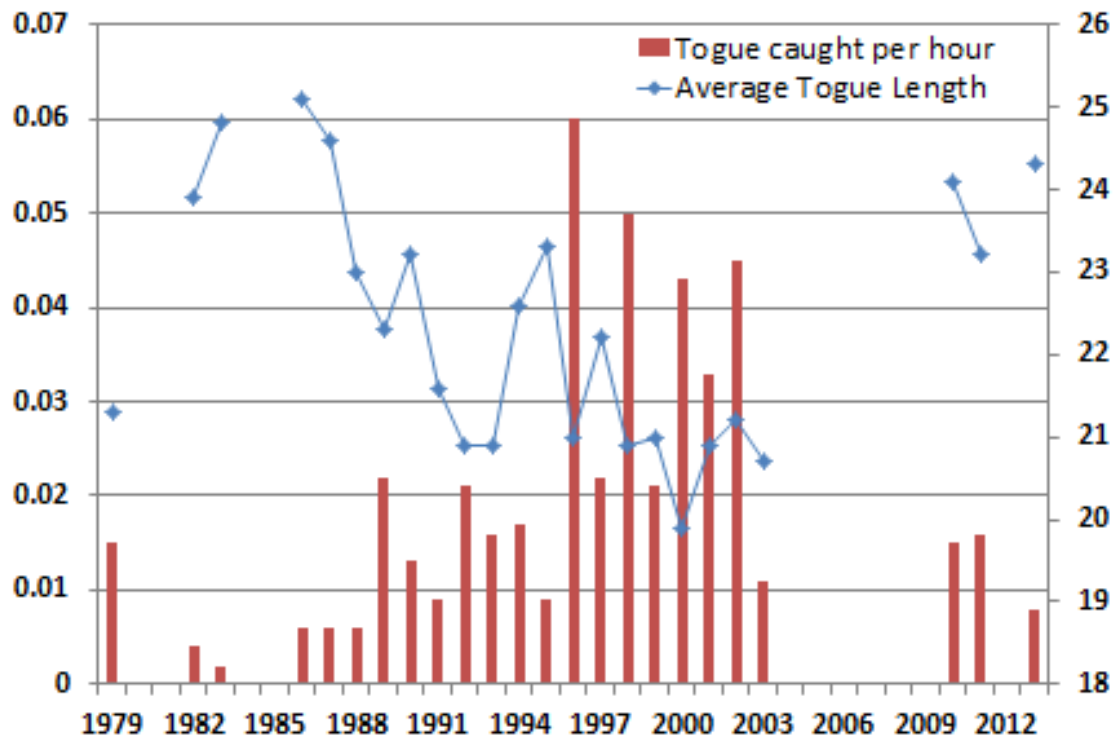
Eagle Lake has the potential to grow larger lake trout with very high condition factor

Generally, in years with low catch rates (low density of fish), average fish size increases

Future benchmark catch rates were developed partly from these data

Togue Size vs Catch Rate, 1979-2013

Clerk Data



SLIDE 8

Early lake trout fishery (pre-1995) was supported only by drop-downs from St. Froid Lake (i.e. low density)

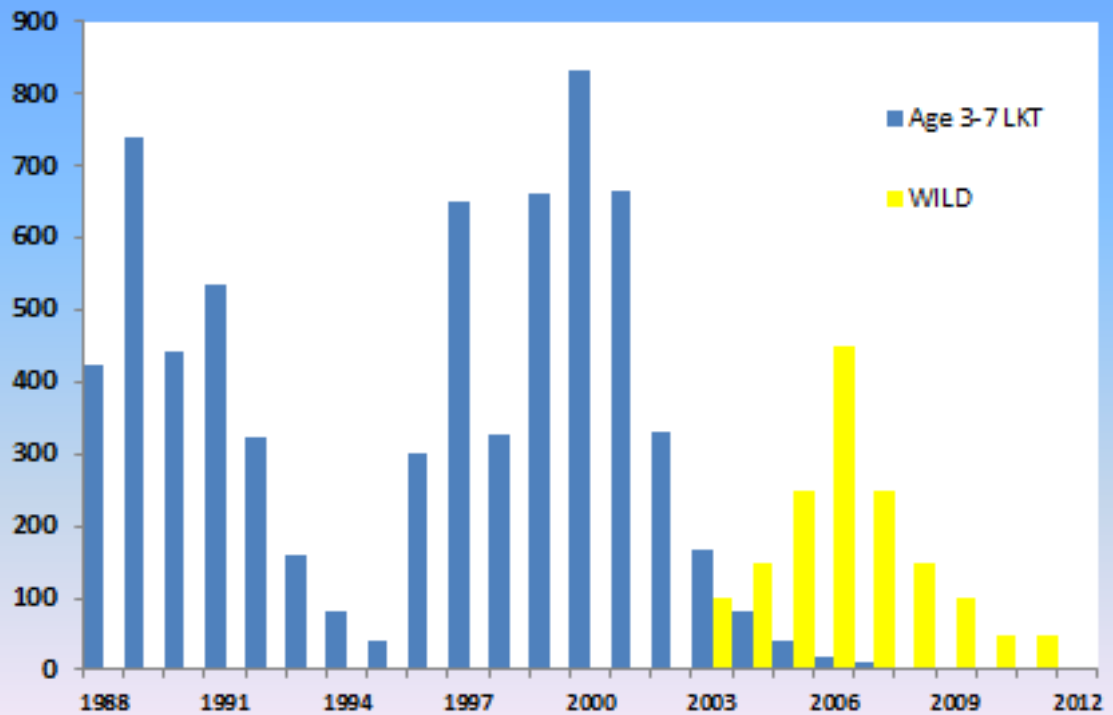
Eagle Lake has the potential to grow larger lake trout under low densities

Generally, in years with low catch rates (low density of fish), average fish size increases

Future benchmark catch rates were developed mainly from these data

CATCHABLE LAKE TROUT from STOCKING

Note – wild numbers in yellow are theoretical

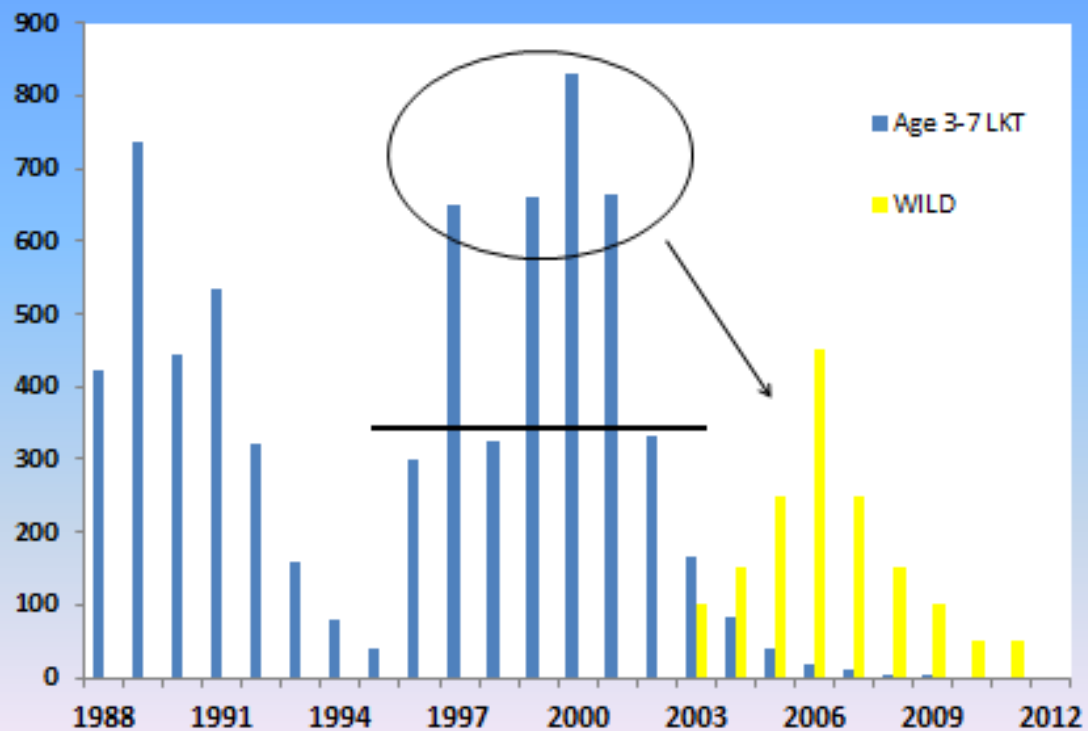


SLIDE 9

Numbers of fish estimated using historic stocking numbers and mortality rates

Wild fish values in yellow are theoretical and presented only to show timing and relative abundance of wild component

HOW MANY TOGUE IS TOO MANY?

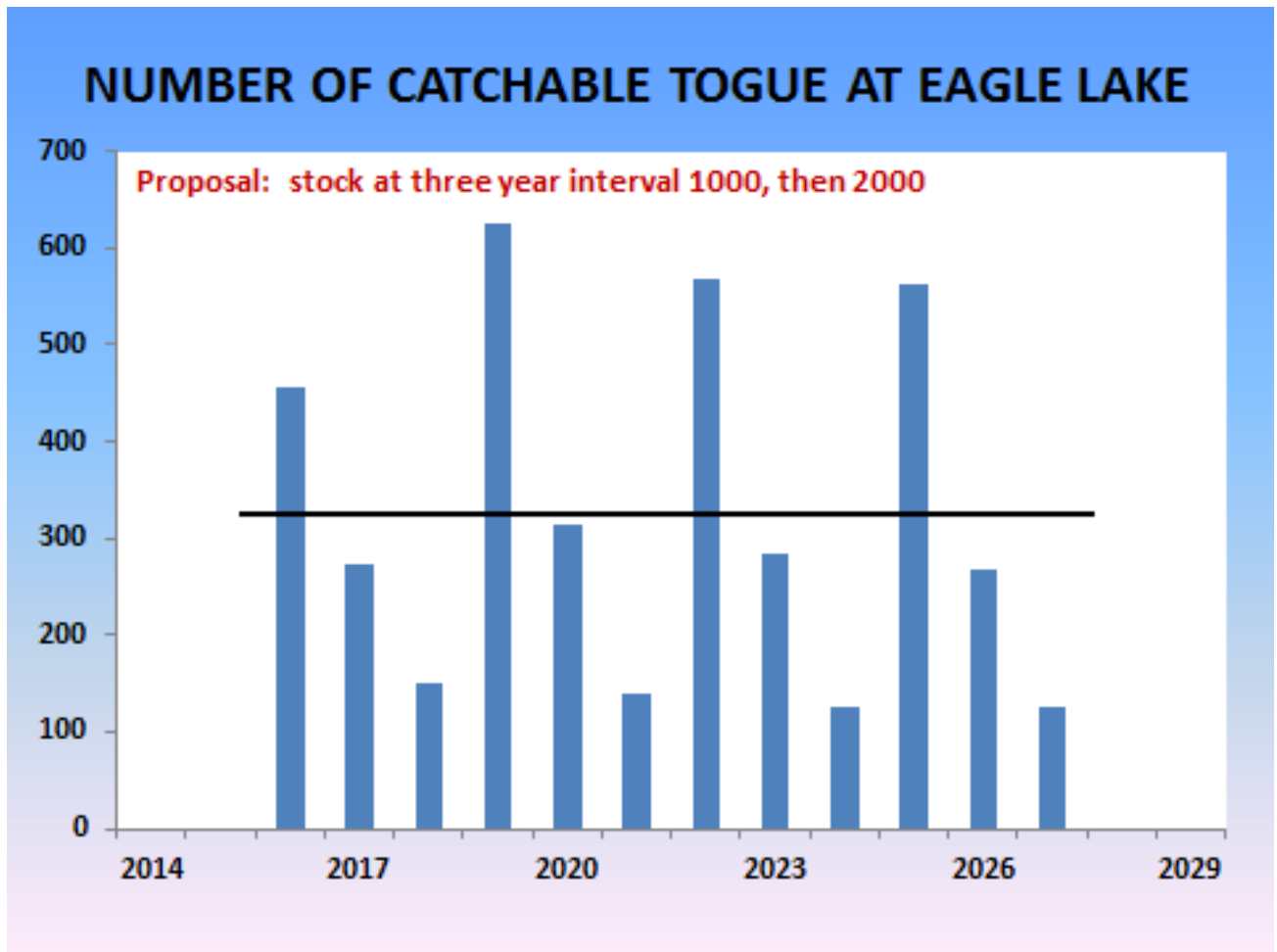


SLIDE 10

Numbers of fish at-large estimated using stocking numbers and mortality rates

Wild fish values in yellow are theoretical and presented only to show timing and relative abundance of wild component

Large number of adult/spawning fish in circle resulted in the surge in wild fish indicated in yellow



SLIDE 11

Predicted number of catchable lake trout at Eagle Lake under a three-year stocking interval, 1000 SYs initially then 2000 SYs thereafter

Fluctuating number of lake trout over time

Numbers do not include the unknown wild component

NUMBER OF CATCHABLE TOGUE AT EAGLE LAKE



SLIDE 12

Predicted number of catchable lake trout at Eagle Lake under a three-year stocking interval, 500 SYs initially then 800 SYs thereafter

Fluctuating number of lake trout over time is expected to result in smelt mortality that is acceptable without significant population changes

Do not expect significant wild recruitment of lake trout under this stocking plan

Numbers do not include the unknown wild component

HOW DO WE STAY ON TRACK?

- **BENCHMARKS** –

- **Togue Catch Rates**
0.01 - 0.02 per hour
- **Average Length Leg. Togue**
23 - 25 inches
occassional > 8 lb fish
- **Smelt Catch Rates**
> 4/hr

- **Additional benchmarks**
 - K Factor
 - Lt at age, etc

Monitor...

- Wild fish
- Adjust stocking/regulations

PROPOSAL

- **3 year togue stocking interval**

- Low chance of stockpiling
- Less competition among age classes
- Less pressure on smelts

- **# of togue**

Achieve low, but catchable no. of togue in fishery

Fast growth, esp. early in life

Togue > 25 inch (5.5 lb)